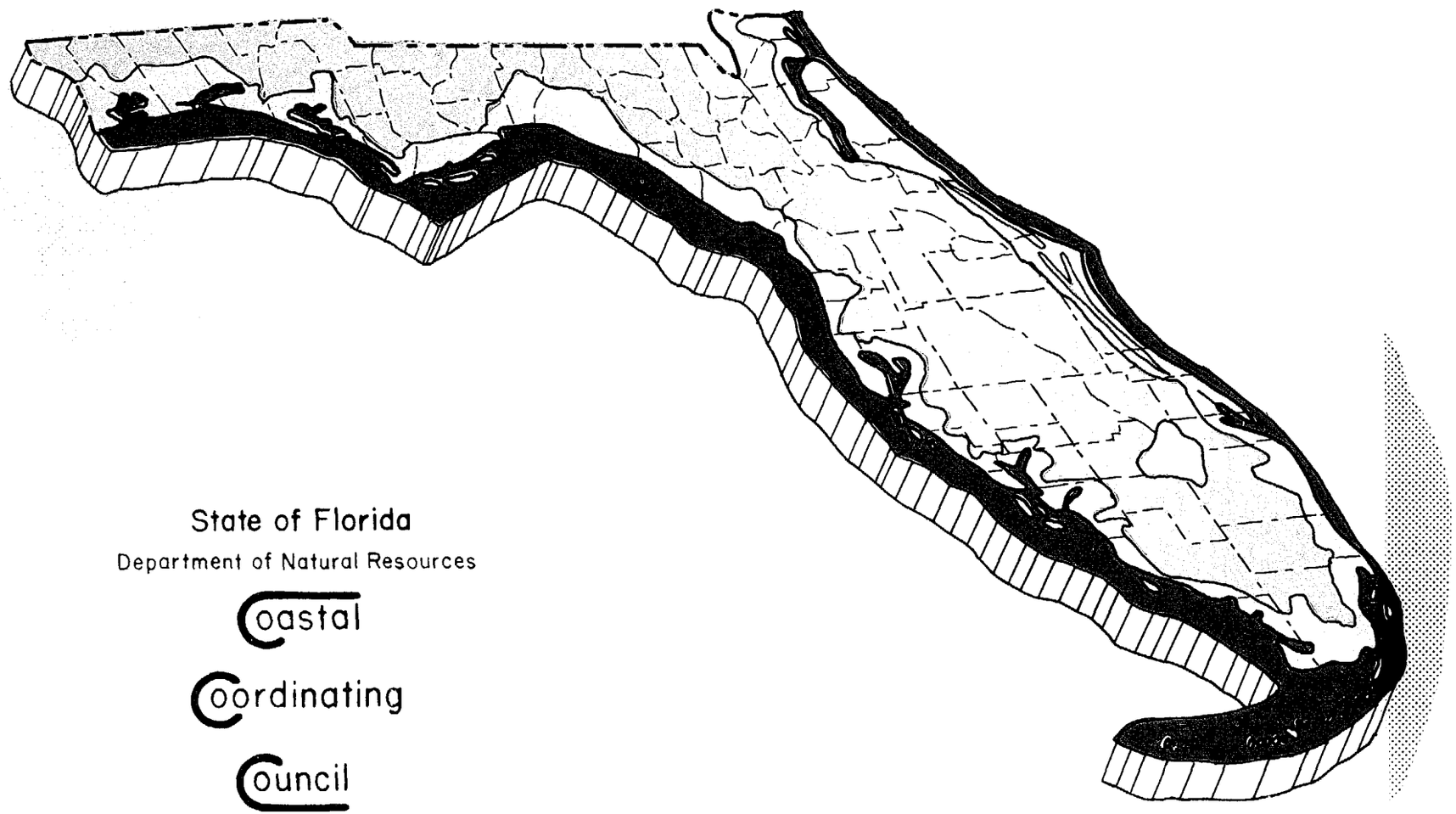
RECOMMENDATIONS FOR DEVELOPMENT ACTIVITIES IN FLORIDA'S COASTAL ZONE



State of Florida

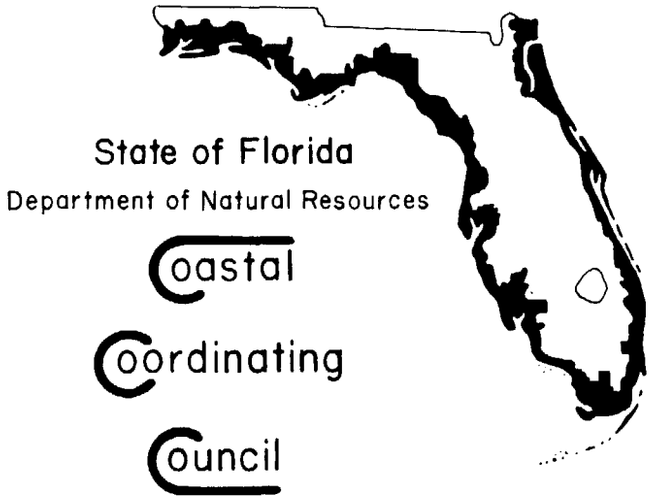
Department of Natural Resources

Coastal

Coordinating

Council

April 1973



RECOMMENDATIONS FOR DEVELOPMENT ACTIVITIES IN FLORIDA'S COASTAL ZONE

April, 1973

COUNCIL MEMBERS

Randolph Hodges, Chairman
Executive Director
Department of Natural Resources

Peter P. Baljet
Executive Director
Department of Pollution Control

Joel Kuperberg
Executive Director
Trustees of the Internal Improvement Trust Fund

L. Kenneth Ireland, Jr.
Secretary
Department of Administration

Staff Coordinator: Bruce Johnson

This public document was promulgated at a cost of $4374.70 or 88¢ per copy including preparation, printing and distribution, for the purpose of providing coastal zone management information to governmental agencies and citizens.

(Recommendations Subject to Change)

TABLE OF CONTENTS

FLORIDA COASTAL COORDINATING COUNCIL RECOMMENDATIONS FOR DEVELOPMENT ACTIVITIES IN FLORIDA'S COASTAL ZONE

(Recommendations Subject to Change)

INTRODUCTION

The coastal zone of Florida is the state's most important and valuable asset. It contains the richest and most diverse combination of plants and animals, is the focus of our industrial and economic activity, and attracts the vast majority of our visitors and new residents. In fact, over 70 per cent of our population is concentrated in only 16 of our 38 coastal counties and this, for the most part, is clustered along the narrow coastal fringe of the counties. If present trends continue, the coastal zone will contain over ten million residents by the year 2000 and will serve a yearly influx of several times that many visitors.

The requirements of this concentration of people have had a serious impact on the natural values of the coastal zone and have become a threat to the health, safety and general welfare of the citizens of this state. It is now widely recognized that a coordinated effort of interested federal, state and local agencies of government is imperative to plan for and effect a solution to this threat.

In pursuit of such a solution, the 1970 Legislature created the Florida Coastal Coordinating Council (Ch. 370.0211, F.S.), consisting of the executive directors of the three state agencies primarily responsible for management of our coastal resources: the Department of Natural Resources, the Department of Pollution Control and the Board of Trustees of the Internal Improvement Trust Fund. The council was recently enlarged by administrative action to include the Secretary of the Department of Administration. The council was given charges to develop a comprehensive plan for the development, protection and zoning of the coastal zone and to provide coordination of planning and management activities involved in the coastal zone.

In response to these charges, the council is striving to develop a plan that would:

1. Be formulated in an objective and impartial manner, utilizing well-defined techniques and criteria.
2. Attempt to strike a balance between development and preservation interests.
3. Be as compatible with local and regional planning efforts as possible.
4. Provide maximum retention of land and water use options for the future.
5. Make maximum use of existing governmental research and management capabilities.
6. Allow for wisest possible use of the coastal zone.
7. Protect the long-term interests of the state by maintaining and enhancing the quality of life in the coastal zone.

In order for such a plan to be meaningful, the council recognizes that there must be a mechanism for promoting its implementation by those governmental bodies having ultimate decision-making responsibility concerning development. In large part, this responsibility has been delegated by the state to city and county governments, many of which have adopted subdivision regulations, building codes, and other such regulations designed to protect the public health, safety and welfare.

It is a lamentable truism, however, that in areas of rapid development and population growth, where effective controls are most urgently needed, pressing day-to-day problems tend to be solved in a manner which often does not adequately consider the regional or long-term consequences of the actions taken. This has in numerous cases forced upon us increasing unplanned social and environmental problems which were not anticipated and were not wanted. The need for greater direction and purpose in decision-making is obvious. The state is now in the initial stages of fulfilling this need through several interrelated programs.

This set of recommendations was developed in recognition of both the local responsibility for promoting community desires and the state's responsibility for protecting the interests of the public at large. The purpose of this publication is threefold:

1. To encourage the wisest use of coastal resources.
2. To aid developers in taking advantage of state-of-the-art techniques and in complying with state and federal regulations concerning natural resources.
3. To aid governmental agencies in developing plans compatible with the state coastal zone management effort.

In developing the recommendations, it was decided that they should be performance-oriented rather than means-oriented. They attempt to identify the desired condition but do not specify exactly how to achieve it. It is felt that this approach will allow more imaginative thinking and flexibility at the local level and still allow adequate protection of state interests. Not only do the recommendations reflect the goals and criteria of numerous state and federal agencies involved in the coastal zone, but also draw upon the thinking of many professional planners, engineers, ecologists, and others actively involved in resource-use management. Many of the recommendations are already partially or fully covered by current regulations and it is particularly important that

county and municipal governments recognize them as an opportunity to develop their own performance standards for local development. This publication is intended to serve as a companion to the *Florida Coastal Zone Management Atlas.*

FLORIDA COASTAL ZONE MANAGEMENT CRITERIA

Most previous planning in Florida has been based upon straightline projections of population increases and per capita needs, with attempts being made to meet demands in the most economical or technically advantageous manner, usually on the simple ground that this represented "progress". Unfortunately, this procedure has little or no possibility of determining "optimum" conditions or when the saturation or breaking point will occur. It also has the unfortunate result of actually encouraging a continuation of past trends, thus amplifying many of Florida's social and environmental ills.

Realizing that planning on the basis of projected population increase or on contemplated increase is fraught with a multitude of built-in perils, the state coastal zone management effort is attempting a relatively new approach to the problem. This approach does not concern itself primarily with anticipated conditions by the year 2000 or any other time frame. Rather, it attempts to determine the type and degree of use that specific portions of the coastal zone can withstand without degradation of its basic resources. With this approach, the Coastal Coordinating Council is attempting to consider the "optimum" conditions and then support various measures which will help attain them, whether it be city size and shape, population distribution, or direct allocation and use of resources.

The Coastal Coordinating Council approach utilizes three major categories or zones of land and water use. These categories—Preservation (no further modification), Conservation (controlled modification), and Development (few if any state-level controls)—are designated after consideration of the following eight factors:

1. Soils suitability of the area.
2. Ecological significance of the area.
3. Susceptibility of the area to flooding, both from runoff and hurricane-driven tides.
4. Historical and archaeological significance of the area.
5. Unique features that may warrant protection.
6. Water quality standards.
7. Present land use.
8. Geological factors to the extent possible with existing information.

Preservation Areas

The preservation concept utilized in the *Florida Coastal Zone Management Atlas* includes those portions of the coastal zone which have overriding ecological, hydrological, physiographic, historical, or socio-economic importance to the public at large. Preserving the natural integrity of these areas enhances the aesthetics and quality of life for residents and tourists, provides a measure of natural hurricane protection, helps maintain a minimum ecological balance, and promotes maintenance of our invaluable commercial and sport fisheries. Public policy should attempt to protect these areas from development to the maximum degree legally possible consistent with private property rights as determined by the courts. In cases where private property rights are involved and all other legal alternatives for achieving preservation goals have proven inappropriate, public funds should be expended for purchase of areas in immediate jeopardy of destruction.

Class I Waters

There are surface waters that are used as a potable source of public water supplies or withdrawn for treatment as such.

Recommendations:

1. No effluent can be discharged into such waters.
2. Dredging in these areas can degrade water quality and should be strongly discouraged.
3. Stringent water runoff controls should be imposed on development adjacent to these waters.

Class II Waters

These are coastal waters which have the capability of supporting shellfish harvesting.

Recommendations:

1. No dredging can be performed in commercially-exploited shellfish waters except for approved maintenance dredging on existing public navigation channels.
2. All developers of the land areas contiguous to these waters should make all reasonable attempts to contain, on site, all wastes generated by development in order to prevent actual or potential degradation of water quality.

Marine Grass Beds

These are shallow water areas containing significant amounts of submerged vegetation. These areas serve as important habitat for many organisms at the base of marine food chains and perform several important functions related to water quality. They are considered crucial to the maintenance of marine productivity.

Recommendations:

1. Marine grass beds should not be modified except in cases of overriding public interest.
2. Marine grass beds are particularly sensitive to increased turbidity that may result from development activities in adjacent areas. Special attention should be given to control of runoff and introduction of nutrients into such areas in order to prevent increased water turbidity.

Selected Coastal Marshes

These are tidal marsh systems having an extent of at least forty acres. Such areas are valuable habitat for numerous species of birds and terrestrial animals. They also provide necessary nutrients to adjacent waters and through their filtering action, help maintain good water quality. Many important marine species are dependent upon marsh systems for survival, and preservation of these areas is considered crucial to maintenance of our marine fisheries. Their storm-buffering function also helps reduce damages to coastal development. Included in this category are "high" marsh areas generally considered as being above the M.H.W. line. Such areas of lesser extent than forty acres are also recommended to be preserved, but due to scale difficulties are not shown in the *Florida Coastal Zone Management Atlas.* Under Chapter 253, Florida Statutes, all marsh areas below the mean high water line are regulated by the Board of Trustees of the Internal Improvement Trust Fund.

Recommendations:

1. Marsh areas of greater than forty acres should be placed off-limits to development that would significantly alter their character.
2. Small patches and shore-fringing strands of marsh should be left undisturbed if possible, with recognition that any such areas below the line of mean high water are subject to direct state and federal regulation and permits are required for their modification.

Selected Coastal Mangroves

These are shore-fringing stands of red, black and/or white mangroves having an extent greater than forty acres. Although it is generally held that red mangroves are the most important and occupy that area between M.H.W. and M.L.W., the three types are often intermixed, making identification of distinct zones within stands very difficult. Similar in function to tidal marshes, these areas are vital to regional marine productivity and offer protection from erosion and flooding.

Recommendation:

1. Mangrove forests should be subject to the same considerations as coastal marshes.

Gulf and Atlantic Beaches and Dunes

This refers to all beaches and dune systems fronting on the open Gulf of Mexico or the Atantic Ocean. These areas, in addition to being very important recreational resources, constitute natural shoreline protection features. Under Chapters 161.052 and 161.053, F.S., all construction seaward of the coastal construction setback line (50 feet inland from M.H.W. unless otherwise established through consideration of natural beach processes) must receive a permit from the Bureau of Beaches and Shores. Local governments, through their building permit systems, have the most effective means of detecting violations and should assure that projects within their areas of jurisdiction abide by the setback law.

Recommendations:

1. No new construction should be allowed that would threaten the stability of either the primary dunes or the beach itself. All construction should be restricted to areas landward of the primary dune line.
2. In areas where dunes are being eroded, local governments should encourage and support dune stabilization projects, preferably utilizing vegetation as the stabilizing medium.
3. Local governments should pursue programs that will guarantee adequate public access to the beaches. Such access should be designed in a manner which protects dune stability.
4. Motorized vehicles should be prohibited from operating on primary dunes except in emergency.

Estuarine Beaches

These are recreation-quality beaches not exposed to the open Gulf or Altantic. Although they are not as extensive or as attractive as open ocean or Gulf beaches, they are important recreational resources that are subject to similar natural forces and development pressures. The state coastal construction setback law does not apply to estuarine beaches.

Recommendation:

1. Local governments should establish requirements in these areas which will guarantee an adequate construction setback line and public access.

State Wilderness Areas

These areas are state-owned lands set aside for preservation in essentially their natural state as part of the State Wilderness System.

Recommendations:

1. No commercial development and no additional development for the comfort and convenience of users is permitted.

2. Public use of these areas is limited to hiking, bathing, boating, fishing, hunting, picnicking, sightseeing, camping, nature study, and research to the extent compatible with the purpose for which the wilderness area was established and as provided in Ch. 18(6) of the *Florida Administrative Code.*
3. Development activities adjacent to wilderness areas should not detract from the values sought to be preserved.

Selected Fresh Water Swamps and Marshes

As used in the *Florida Coastal Zone Management Atlas,* these are areas having a high water table, predominantly internal drainage, and supporting extensive stands of water-tolerant vegetation. Such areas are unsuitable for intensive land uses without major alteration. They are usually of substantial ecological importance and serve as natural retaining mechanisms for surface water storage. Some swamps and marshes may also function as aquifer recharge areas.

Because of the ecological significance of these areas, their value for hydrologic purposes and their intrinsic unsuitability for intensive development, they should be preserved in essentially their natural state. The state and federal governments presently have only limited authority to ensure this, except in wildlife refuges, state and national parks, state wilderness areas, areas subject to flowage easements, or other areas in public ownership. The majority of fresh water swamps and marshes in the coastal zone are in private ownership with very few effective controls on their use. Development in swamp and marsh areas has a high initial cost and a high continuing cost that is often borne by government. Such problems as periodic flooding, poor stability of roads and streets, creation of health hazards, and subsequent expenditures of tax money for corrective measures are often encountered in such areas. Development in fresh water swamps and marshes, therefore, is likely to become an unnecessary tax burden.

Recommendation:

1. Local governments should strongly discourage development in these areas through the application of zoning, easements, tax incentives, and other methods that may be appropriate.

Historical and Archaeological Sites

These are areas of outstanding historical or archaeological significance designated by either the federal government or the Florida Division of Archives and History. Florida's rich and colorful history has endowed the state with a valuable assortment of such areas, and although it is state policy to protect them, many important sites are in private ownership, In such areas the state is often powerless to prevent their destruction by private interests and must rely solely on local governments to protect the public interest.

Recommendations:

1. Because these areas are important assets to both the local area and the state in general, local governments should institute conscientious programs designed to identify and preserve all significant sites not already protected by federal or state programs.

Other Unique Environmental Features

These are natural features of an unusual or unique character, usually of comparatively small geographic extent. Examples range from such diverse things as coral reefs to unusual sinkholes, caves and springs. Also included are waters given a "special stream classification" by the Department of Pollution Control. These are wild or scenic rivers, spring-fed streams and others whose character is such that they should be preserved for all posterity. The state has incorporated many such areas into its State Park System or protected them in other ways. There remain, however, many unprotected areas that are of value to both local and state interests.

Recommendations:

1. These areas should be protected where possible through the application of local zoning, tax incentives, purchase, easements, or other appropriate means.
2. Any development in these areas should incorporate special precautions to avoid damaging the character of the feature.
3. In or adjacent to waters having the "special stream classification", development that requires dredging for navigational access will not be permitted. Development adjacent to such waters should be subject to very strict water runoff control standards.

Conservation Areas

Conservation areas are the lands and waters within the coastal zone that are not absolutely critical to regional ecological integrity (except certain wildlife refuges) but which, because of their physical character or present use, require special precautions when being converted to development in order to avoid direct or indirect consequences harmful to the public health, safety and welfare. They also provide "buffer zones" for preservation areas and represent retention of use options for future generations.

Class III Waters

These are all coastal waters not otherwise specifically classified by the State Department of Pollution Control. Included are bays, rivers, lakes, estuaries, and open

waters of the territorial sea. The primary requirement for these waters is that they be maintained at a quality sufficient to allow body contact water sports and propagation of fish and wildlife. Within this classification, however, is the "special stream classification" mentioned earlier. These streams are considered as "unique environmental features" and are indicated as preservation areas in the *Florida Coastal Zone Management Atlas.*

Recommendations:

1. Any development and subsequent use in or bordering Class III waters should ensure that present water quality is not degraded. This includes prevention of pollutants from entering the water and strict control of activities which may increase water turbidity.

Aquatic Preserves

These are state-protected coastal areas having exceptionally high biological, aesthetic, education, and/or scientific value. Such areas are established by the state after public hearings at the local level. They generally include only lands below the line of mean high water.

Recommendations:

1. Bulkhead lines will not be set within an aquatic preserve. Development adjacent to such areas should not anticipate utilizing land below the mean high water line, and any "high marsh" (above M.H.W.) or mangroves adjacent to an aquatic preserve should also be left undisturbed.
2. Within an aquatic preserve, there shall be no alteration of physical conditions except minimum dredging and spoiling for authorized public navigation projects or other approved activity designed to enhance the quality or utility of the preserve itself.
3. Traditional public uses of the area, such as fishing, hunting, boating, and swimming are allowed.
4. Other uses of an aquatic preserve may be allowed after a formal finding of compatibility made by the Trustees of the Internal Improvement Trust Fund.

Aquaculture Leases

These are state-owned water areas that are leased for experimental or commercial cultivation of animal or plant life. Traditional oyster leases are not included in this category.

Recommendations:

1. Such areas are to be utilized in a productive manner in the public interest, as decided by the Board of Trustees of the Internal Improvement Trust Fund, and in accordance with *Aquaculture Lease Guidelines, August 26, 1969.*
2. Public hearings are required before a lease may be granted. Such lease will not be granted if the appropriate county commission adopts and files a resolution of objection to the lease.
3. Because of the problems associated with granting exclusive rights for use of state-owned submerged lands and the overlying water column, aquaculture interests should attempt to confine their activities to nearshore upland areas if possible. This has certain advantages from a quality control as well as public relations standpoint if technology permits such upland location.
4. Aquaculture activities should be subject to the same pollution control criteria as any other industry.
5. Aquaculture activities should explore the feasibility of utilizing "cleanup" species in conjunction with their "production" species to help prevent water pollution from fecal matter, high nutrients and B.O.D., low D.O., etc.

Spoil Islands

These are artificial islands created with material dredged from state-owned lands to create or deepen channels. Such areas often become covered with mangroves and other salt-tolerant vegetation and serve as bird resting and feeding areas. They may also serve as water-oriented recreation areas.

Recommendations:

1. Any modification of spoil islands requires a permit from the Trustees of the Internal Improvement Trust Fund.
2. Spoil islands in urban areas should be left undeveloped to serve as green areas, bird resting and feeding areas and/or water-oriented recreation areas not requiring major expenditure of public funds.

Hurricane Flood Zone

This encompasses lands between the shoreline and the 100-year flood line; that is, the area subject to flooding by hurricane-driven tides on a statistical probability of once every 100 years. It should be kept in mind that this frequency prediction represents an average that may occur several times within a short time span or may delay for a considerable period. Most of the heavily-populated and rapidly-growing cities of South Florida have been very fortunate in the last three decades and have not been subjected to devastating hurricanes. Unfortunately, this has caused a false sense of security in many areas, thus setting the stage for natural disasters on a massive scale.

It should be recognized that hurricane-driven tides are accompanied by severe wave action and are potentially far more destructive than rising water associated with poor drainage. For this reason, development in the hurricane flood zone should recognize the hazards and use proper construction techniques.

It should also be recognized that the National Flood Insurance Program utilizes the 100-year flood line as a basis for granting flood insurance. To qualify for insurance under

this program, all new residential construction must have ground-floor elevations above the 100-year flood stage. Other uses have the option of either making ground-floor elevations above this level or flood-proofing buildings to that height.

Recommendations:

1. Any development in the hurricane flood zone which would unnecessarily jeopardize public health, safety or welfare should be prevented.
2. All residential construction in the hurricane flood zone should have ground-floor elevations above the level subject to flooding by the statistical 100-year hurricane.
3. All construction in the hurricane flood zone should be storm proof and flood proof against a statistical 100-year storm.
4. All high-intensity development in the hurricane flood zone should be serviced by central sewer systems. Septic tanks should not be allowed in residential subdivisions or other high-intensity uses of the hurricane flood zone.
5. Sewage treatment plants, industrial holding ponds or other potentially polluting facilities should not be constructed in the hurricane flood zone. If alternate locations inland are not available, special hurricane flooding precautions should be taken in design and construction of the facility.

River Flood Plains

These are lands lying along drainage corridors (rivers and streams) that are subject to flooding on a regular basis. These areas usually contain mixed alluvial, poorly-drained soils and natural vegetation that is adapted to fluctuating water levels. The vegetation is especially important in that it provides diversity to the landscape, serves as vital habitat for numerous species of birds and animals and performs very significant ecological functions for the waters that flow through the drainage corridors.

Development in flood plains is usually very expensive, both initially and in terms of continuing maintenance costs. In spite of steadily increased expenditures on flood control structures, national losses due to floods continue to rise at an alarming rate. It is ironic that the most important factor contributing to this situation is persistent invasion of the flood plains by those land users most likely to suffer large financial losses from floods. Any development in flood plains that does not actually require access to waterfront is likely to become an unnecessary financial burden to local, state and/or federal government and should be subject to very strict regulation.

Recommendations:

1. Unless water access is required, development in flood plains should be prevented rather than later attempting to protect such investments through construction of flood control structures at public expense.
2. Natural vegetation in flood plains should be preserved to the maximum degree possible to prevent erosion, retard runoff and protect the natural beauty of the flood plain.
3. Any structures built in flood plains should be designed to allow free flow of water.
4. There should be no open storage of fertilizers, chemicals or or other potentially polluting materials in flood plains.
5. Any flood plain development should be serviced by central sewage facilities, with treatment plants located out of the flood plain.
6. All activities in flood plains should consider their potential detrimental effects on water quality and downstream resources and take adequate measures to prevent these effects.
7. Flood damage prevention facilities should be incorporated in all flood plain development.
8. Channel improvement projects intended to provide flood protection should be considered only after it has been determined by appropriate state and federal agencies that land treatment and all feasible floodwater retarding structures will not provide an adequate level of flood protection.
9. Channel improvement should not be used where its primary purpose is to bring new land into agricultural production or make land suitable for nonagricultural development.
10. In nonagricultural flood plains where water access is required, the level of flood protection should be sufficient to protect users from a 100-year flood, with non-structural devices (zoning, flood proofing, early warning systems, minimum ground floor elevations, etc.) being the preferred techniques for achieving the necessary protection.
11. In cases where channel improvements for flood protection have been fully analyzed and justified, such projects should be carried out with minimum losses to fish and wildlife and in accordance with Soil Conservation Service Watersheds Memorandum 108, "Guidelines for Planning and Review of Channel Improvement."

Scenic Vistas

These are peripheral parcels of land and/or water having exceptional scenic or aesthetic values. Such areas may include bluffs, hills or other vantage points that offer a unique scenic perspective. The intangible and sometimes tangible values to be realized from preserving the character of these areas is becoming increasingly evident, especially in areas undergoing rapid urbanization. Unfortunately, as urbanization occurs, the long-term intangible values of scenic vistas generally are sacrificed for immediate economic interests unless these areas are in public ownership or are subject to scenic easements.

Recommendations:

1. Scenic vistas should be purchased by local government if possible.
2. If outright purchase of scenic vistas by local government is not possible, purchase of scenic easements should be attempted.
3. Control measures such as tax incentives, zoning and strict building codes can and should be applied to scenic vistas to protect their character.
4. Development in the vicinity of scenic vistas should not detract from the character of the area.
5. Scenic quality should be given a high order of importance in local and regional comprehensive planning.

Forestry and Game Management Areas

These are areas having high-quality timber or good timber-producing potential and/or support game populations large enough to allow inclusion into the state's game management program. Forestry and game management areas owned by the state or federal government are generally not subject to development pressures. Many such privately-owned areas, however, are forced into development by taxation policies based upon revenue-producing potential rather than actual use of the land. This situation can thwart state efforts at retaining such areas in an undeveloped condition. The recently-enacted "greenbelt law" (Ch. 72-181, Laws of Florida) provides tax incentives for leaving forestry and game management areas in an undeveloped condition, and landowners should be encouraged to take advantage of its provisions.

Recommendations:

1. In general, forestry and game management areas should be left in an undeveloped condition.
2. Landowners wishing to retain their lands in an undeveloped condition should take advantage of the significant tax savings provided by the recently-enacted "greenbelt law" (Ch. 72-181, Laws of Florida).

Wildlife Refuges

These are areas specifically set aside for the protection of wildlife. Such areas may be subject to multiple use, as in the case of state parks, all of which are game refuges. Newly-enacted legislation (Ch. 72-309, Laws of Florida) allows the state to lease lands for 50 years or more for use as wildlife sanctuaries. It also provides tax relief on those lands.

Recommendations:

1. Intensive development in or immediately adjacent to these areas should not be a part of local development plans.
2. Low-intensity recreational development may be compatible with wildlife refuges, but extreme caution should be taken to insure that wildlife values are not jeopardized.
3. Owners of ecologically-important areas should be strongly encouraged to take advantage of Ch. 72-309, Laws of Florida.

Parks and Recreation Areas

These are areas devoted to outdoor recreational activities of various types. This may include historical and archaeological sites, game refuges or unique environmental features. It is impossible for state government to meet all outdoor recreation needs of residents and tourists. Therefore, local governments and private owners must be relied upon to satisfy a large portion of the needs. As urbanization intensifies, this situation becomes increasingly critical, emphasizing the wisdom of providing development controls that will prevent degradation of recreation areas.

The recently-enacted "greenbelt law" (Ch. 72-181, Laws of Florida) provides a mechanism for encouraging retention of privately-owned parks and recreation areas. By offering tax incentives in accordance with this law, municipal and county governments can aid the state significantly in meeting future outdoor recreation needs.

Recommendations:

1. Local governments should formulate land use controls that will prevent incompatible development in or adjacent to parks and recreation areas. These controls should be designed to foster recreation-oriented development in these areas and allow for future expansion of recreation facilities.
2. Owners of undeveloped lands having recreation potential should take advantage of the significant tax savings provided by the greenbelt law.

Marginal Lands

Marginal lands, as used in the *Florida Coastal Zone Management Atlas,* are those areas that require major alterations before they are suitable for intensive development. Examples of limitations of these areas are poor drainage, susceptibility to flooding, and soils having low permeability, high water table and/or low-bearing strength. There are varying degrees of marginality, and most of the limitations may be adequately overcome by technology. Generally speaking, however, intensive development of areas having moderate to severe limitations involves excessive modification of the landscape, large initial expenditure of funds, a high maintenance cost, and presents continuing problems for local government. In addition, intensive development of marginal lands can generally be anticipated to have significant ecological impact unless very careful planning precedes development.

Recommendations:

1. Because of the wide range of problems associated with intensive development of marginal lands, policies of local government should specify extreme caution and very careful site planning before intensive development takes place in these areas.

2. Development that does occur in marginal lands should utilize central sewage collection and treatment facilities.
3. Special care should be taken to minimize environmental impact of landscape modification in marginal lands.

Development Areas

Development areas, as used in the *Florida Coastal Zone Management Atlas,* include (1) areas already developed, (2) undeveloped areas now vacant or used for other purposes, including forestry and agriculture, which are intrinsically suitable for intensive development, and (3) undeveloped lands having some physical limitations—drainage problems, poor permeability, salt-water intrusion—which can be corrected by minor drainage techniques, central sewage systems or central water supplies. In general, these lands are not considered to be environmentally fragile. However, there are presently developed areas that would have been recommended for "conservation" and "preservation" zoning had they not already been developed. Such areas are classified as "conflict" areas in the atlas. Decisions concerning specific uses within "development" areas are considered almost entirely the responsibility of local government, an exception being developments on the immediate shoreline of estuaries and along the open Gulf of Mexico and Atlantic Ocean. In addition, activities in development areas which may degrade air and water quality are subject to direct state regulation. The other subcategories of "development areas" are included in the atlas as an aid to local government and developers. These subcategories are designed to indicate the most favorable areas for development, the relative degree of landscape modification needed, and the types of physical limitations that may be anticipated.

Class IV Waters

These are surface waters designated by the Florida Department of Pollution Control for use as agricultural and industrial water supply. Because their primary use is for irrigation, stock watering or industrial purposes, these waters are vulnerable to contamination from excessive nutrients, pesticides or industrial wastes. For this reason, maintenance of ecological balance in these waters is very difficult, but unless reasonable water quality is maintained in Class IV waters, there is a potential for inflicting severe ecological damage on adjacent water bodies.

Recommendations:

1. Extreme care should be taken to minimize irrigation runoff into Class IV waters.
2. Feed lots and livestock pens should have pollution control facilities that will prevent contamination of surface waters by animal wastes.
3. Any industrial contaminants or other deleterious substances introduced into Class IV waters should not be in amounts sufficient to render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process watering supply purposes, and fish survival.

Class V Waters

These are surface waters designated by the Florida Department of Pollution Control for navigation, utility and industrial use. Standards for these waters are the lowest of any applied to surface waters in Florida. These waters will possibly be reclassified as corrective measures are taken and water quality improves.

Recommendations:

1. Because the low quality of Class V waters poses a hazard to adjacent water resources, all possible measures should be taken to upgrade them immediately.

Presently Developed Lands—Non-Conflict

These are areas developed in a manner compatible with the natural environment. These areas require little or no state action to protect the public interest, an exception being in the case of new shoreline development that could threaten coastal resources.

Recommendations:

1. Further development in these areas should be subject to strict controls at the local level to insure compatibility with both the natural environment and existing uses.

Presently Developed Lands—Conflict

These are presently developed areas that would have been classified "preservation" or "conservation" under Coastal Coordinating Council criteria. A wide range of conflicts exists within this category and includes development that has unnecessarily destroyed significant natural resources or has not taken into account natural forces and/or characteristics that create significant problems for society. Examples are: use of septic tanks in unsuitable areas, filling in of valuable estuarine areas for housing subdivisions, construction in the hurricane flood zone that does not recognize the hazards involved, and drainage of major swamps and marshes for intensive uses.

Recommendations:

1. Further intensification of incompatible development in these areas should be discouraged by local government.
2. In the event that intensive uses within "conflict" areas become victim to natural

catastrophies such as hurricane winds, erosion, storm surge, etc., future redevelopment should be restricted to uses that recognize and adequately neutralize the conflicts involved.

Undeveloped Lands Suitable for Intensive Development

These are lands needing little or no modification to make them suitable for development. Such areas have elevations, soils, topography, and other physical conditions favorable for development if appropriate environmental safeguards are utilized. It is not necessarily advocated that all such areas be intensively developed. Rather, it is the Coastal Coordinating Council's intent to indicate to local planners, developers and governmental agencies the most favorable areas for development and to stress the importance of guiding future growth into these areas. Controls on distribution, density and design of development within such areas are almost entirely the responsibility of local government, with possible technical assistance from the state and federal government upon request.

Recommendations:

1. All development in these areas should utilize adequate environmental safeguards.
2. Local governments should formulate long-range plans for orderly development in these areas and adopt land use controls which assure that location and timing of new development is in accordance with the ability of government to provide and maintain necessary services such as streets, sewers, solid waste disposal, water supplies, schools, and police and fire protection.

Undeveloped Lands Suitable for Intensive Development with Corrections

These are areas having some physical limitations but suitable for intensive development with certain minor modifications such as improvements of drainage, installation of central sewage facilities and central water supplies. These areas are illustrated in the *Florida Coastal Zone Management Atlas* to assist local planning and zoning officials, developers and landowners in determining those areas where intensive development activities will require additional expenditures to become environmentally compatible. Development controls within these areas will be almost entirely the responsibility of local government with possible technical assistance from state and federal agencies upon request.

Recommendations:

1. Local governments should formulate long-range development plans for these areas.
2. Local governments should adopt effective performance standards to insure that development in these areas is compatible with the physical environment.
3. Local governments should adopt land use controls which assure that location and timing of new development is in accordance with the ability of government to provide and maintain necessary services such as streets, sewers, solid waste disposal, water supplies, schools, and police and fire protection.
4. Developers involved in these areas should assume, as a part of construction costs, neutralization of any conflicts with the natural environment.

Hurricane Flood Zone

Significant development has already occurred in our hurricane flood zone without taking into account the hazards involved. Much of this development has so far been fortunate, suffering little or no damage from hurricane-driven tides. History and probability calculations, however, indicate that many intensively developed sections of our shorelines are in for a rude awakening. If development in these areas is allowed to continue without consideration for natural forces, probable storm losses will increase at a rate proportional to increased development.

Future storm losses can be minimized, but only if they are anticipated and planned for. This, of necessity, will involve education of the general public through civil defense programs and imposition of stringent building standards in areas subject to hurricane flooding.

Recommendations:

(Also see Conservation Areas—Hurricane Flood Zone)

1. Local governments should adopt special building standards for the 100-year hurricane flood zone, with provisions for utilization of latest wind damage and flood prevention techniques.
2. Building permits should not be granted for new construction or renovation of existing structures in the hurricane flood zone unless design features can be anticipated to withstand hurricane force winds and storm-driven waters.

GENERAL RECOMMENDATIONS APPLICABLE THROUGHOUT THE COASTAL ZONE

Immediate Shoreline Use Priorities

With limited shoreline and increasing competitive demands, agencies having advisory or controlling powers over shoreline development must consider priorities of land use. Those activities that can only function through use of waterfront property or access to it must have first priority for inclusion in shoreline areas designated for development. Of second priority are those activities that can function inland but a shoreline location

significantly enhances the land use on an economic or aesthetic basis. Any waterfront use, of course, must still make every effort to minimize environmental impact. Land uses not requiring a coastal location or that are not economically or aesthetically enhanced to a significant degree should be discouraged from waterfront locations since there are sufficient areas inland. Multiple compatible uses of a locale are to be encouraged.

A considered *priority* of shoreline uses can be summarized as follows:

1. Preservation
2. Conservation (including Recreation)
3. Development
   a. Military (where necessary to assure the security of the area and country)
   b. Ports and Water-Related Industry
   c. Transportation (when waterfront location is mandatory)
   d. Utilities (when waterfront location is mandatory. Transportation and Utilities are fundamental to the development of any area.)
   e. Water-Related Commercial
   f. Residential
   g. Commercial enhanced by waterfront
   h. Industry enhanced by waterfront

Recommendations:

1. Local development policies should reflect the above listing of shoreline use priorities.

Military Activities

Military activities are, for the most part, beyond the control of local government. Generally speaking, development of installations or modifications to military facilities are dictated by considerations of a much wider scope than can be viewed at the local level. National policy is to minimize environmental impact of military activities, with special regulations covering most items of concern from a planning standpoint. Therefore, state guidelines for military installations are inappropriate.

Ports and Water–Related Industry

Ports and water-related industries are basic activities upon which many other segments of the economy depend. Efficiency and economy usually dictate that the various secondary industries dependent upon primary industries should locate close to them. This reduces the cost to the public of added services such as roads and also reduces product cost.

Unfortunately, most of Florida's ports have been hampered by unfavorable physical conditions and encroachment of urban activities into adjacent areas. These factors make port and industrial expansion, modernization of facilities or introduction of new industries extremely difficult. As a result, Florida's ports face the unpleasant task of overcoming physical and ecological restrictions on development as well as serious conflicts with urban activities. In some cases facilities may be relocated to more favorable areas where expansion and better efficiency are possible, but the selection of suitable locations is extremely limited and will become increasingly critical in the future.

It has become evident that Florida's ports, if they are to remain competitive with other ports having more favorable physical conditions, will have to explore alternatives to traditional methods of cargo transshipment. The trend toward use of ever-larger ships indicates that continued channel dredging has little promise of meeting depth requirements of future shipping, and significant ecological damage can be anticipated if past practices of port development are not altered. It must be realized, however, that dredging and filling to some degree is absolutely necessary for efficient port operation. But this should not be the only alternative considered for enlarging and improving port operations. Offshore transfer facilities must be adequately considered as a means of overcoming the need for dredging ever-deeper harbors and channels to accommodate large ships.

Recommendations:

1. Some dredging and filling will be necessary to provide for port expansion and maintenance, but any permitted fill or dredging should be in accord with an over-all regional port development plan evaluated by state agency professionals and then modified as necessary to minimize any harmful effects.
2. Ports should be designed in a fashion that requires a minimum of maintenance. Water scouring action should be utilized if possible to prevent formation of silt traps which require continuous maintenance dredging.
3. Due to the scarcity of suitable port sites in Florida, creation of new ports in competition with older, well-established ports should be discouraged.
4. Offshore transfer facilities and lightering operations should be fully explored as an alternative to major channel and harbor-deepening projects.
5. Port districts should project space needs for port and water-related industrial expansion at least 20 years into the future and reserve adequate space for these purposes. Tax policy should recognize that not all of the reserved land will be needed immediately and other uses can be allowed in the interim.
6. Land identified with water-related industry should be used by industries specifically requiring waterfront sites. Industries linked to them but not requiring waterfront should be located away from the shoreline.
7. To reduce shoreline pressure that will develop for industries not requiring waterfront sites, freeways and railroads in upland locations should be en-

couraged, with nearby sites reserved for industries requiring the combination of rail and freeway.
8. Consideration should be given to cooperative use of docking, parking, cargo handling and storage facilities.
9. All port facilities should have up-to-date oil spill equipment and the capability to employ these on short notice.

Transportation and Utilities

Construction of transportation routes and utilities in Florida generally anticipates projected needs for the forseeable future, and although this has not been the case in many past projects, direct ecological effects are now being considered. It is apparent, however, that consideration of *direct* effects, by themselves, is not enough, and second and third order effects must also be considered if possible.

Realizing this, it becomes evident that in many cases properly analyzed and planned projects can be an effective tool for guiding future development toward more favorable end products. This can ultimately reduce undesirable second and third order consequences such as pollution from development, flooding problems, high maintenance costs for local government, and long-term destruction of natural resources.

Recommendations:

1. Major highways, freeways and railways should be located inland from the shore, except in port and heavy industrial areas. Existing shoreline roads should not be expanded but reserved for slow-moving recreational traffic.
2. All new transportation and utilities construction should attempt to avoid coastal wetlands.
3. In cases where coastal wetlands cannot be avoided, bridging should be used to the maximum degree possible rather than filling to create road beds. Toll plazas, service yards, or other ancillary facilities should be located on existing land, not on new fill. The facility should be designed in a manner that does not invite additional filling of the waterfront for other purposes.
4. Highway corridor analysis in undeveloped areas should consider suitability of the adjacent land for urbanization. Routing should be designed to guide growth into favorable areas and away from ecologically-sensitive areas. In cases where this is not possible, access should be strictly limited.
5. Structures over water should be designed to allow free flow of water and not cause excessive shoaling, as well as provide adequate clearance for commercial and pleasure boats.
6. Maximum care should be taken to prevent concentrated runoff from roadways from entering adjacent water bodies. Storm sewers, ditches or other drainage systems should not empty directly into open water. Holding basins should be created to allow settling of suspended matter and gradual release (preferably through swales, wetlands and other areas of natural sheet flow) to open water.
7. All slopes and road cuts should be stabilized by vegetation or other means as soon as possible in the construction of the facility to prevent unnecessary erosion.
8. Catwalks and fishing platforms should be constructed on new bridges, where appropriate, to provide recreational use of these structures.
9. All transportation and utilities construction that involves wetlands or navigable waters must have state approval.
10. Maximum retention of natural vegetation should be attempted with all transportation and utilities projects.
11. Underground utilities placement should be strongly encouraged.

Commercial Development

Commercial developments are those uses which are involved in wholesale or retail trade, services or other business activities. Such activities are generally intensive uses of space and usually require extensive service facilities such as parking to accommodate customers.

Recommendations:

1. Commercial shoreline development should be restricted to those activities that require a waterfront location. Professional offices, hospitals, shopping centers, and other non-water dependent commercial activities should be located inland.
2. In shoreline areas where commercial development is already a dominant use, parking facilities should be located away from the shore, with public access provided if possible.
3. Any shoreline commercial development should be compatible with adjacent uses.
4. Aesthetics should be a primary consideration in local decisions regarding commercial shoreline uses.

Marina Location and Design

Marinas are facilities which provide boat launching and storage, boating supplies and services for small pleasure craft. There are three basic types of marinas in Florida: the open structure type, where open pilework and/or floating breakwaters are used; the solid construction type, where bulkheads and land-fill are used to provide moorings and

shelters; and the dry storage type, where boats are stored in specially-designed warehouses placed entirely on the upland. Each type has advantages and disadvantages to varying degrees, depending upon site characteristics. Dry storage facilities appear to be the most efficient type for boats smaller than 24 feet. For larger vessels, wet storage (docking) must generally be provided.

To be successful, small boat marinas generally must have sufficient demand for services, protection from rough water, slight water currents, easy access by land, short running distances to popular fishing and boating waters, and room for expansion of facilities.

All marinas affect aquatic or marine habitats to some degree, but adverse effects can be minimized by utilizing proper location and design features.

Recommendations:

1. Marinas should be located in areas where maximum physical advantages exist and where least dredging and maintenance will be required.
2. For marinas catering primarily to craft smaller than 24 feet, upland dry storage facilities should be used rather than dockage.
3. Marina construction should avoid unnecessary destruction of marsh areas, shellfish beds and submerged grasses.
4. Open dockage extending to deep water should be considered as an alternative to dredging for navigational access.
5. Turning basins and navigation channels should be designed to prevent long-term degradation of water quality. Deadend or deep canals without adequate flushing should be avoided.
6. Marinas that cater to live-aboard craft should be equipped with sewage collection systems for servicing the vessels.
7. Regional as well as local need data should be considered as input in location of marinas.
8. All plans for marina development should be submitted for review by appropriate state regulatory agencies at the earliest possible time to prevent unnecessary delays in gaining approval.
9. Spoil disposal areas should be designated and obtained prior to initial development of marina facilities.

Shoreline Modification

Florida's shoreline generally requires some degree of modification before it can be utilized for development of any sort. But such modification, unless carefully planned, can have adverse effects far beyond the area directly altered for development. For this reason, all shoreline modifications are subject to close scrutiny and regulation by state and federal agencies. State permits are required for *all* construction below the line of mean high water in navigable waters.

Bulkheads and Bulkhead Lines

Bulkheads are retaining structures utilized to stabilize a shoreline or to make it more accessible. A bulkhead line is a delineation of the maximum seaward extent to which a bulkhead may be allowed. Such delineation requires state approval. A common practice in Florida has been to erect vertical seawalls out into the water and then place fill material on the landward side of the structure. This practice has proven in many cases to be both ineffective and very destructive to marine productivity. Other techniques are being explored as means of overcoming those problems.

Recommendations:

1. Bulkheads should never be constructed until a bulkhead line has been formally approved by the Florida Board of Trustees of the Internal Improvement Trust Fund, and other necessary approvals are received.
2. Bulkhead lines should be set at, or landward of, the mean high water line.
3. Where possible, sloping rip-rap structures should be used rather than vertical seawalls.
4. Bulkhead construction should avoid sharp-angle turns that may collect trash or cause shoaling or flushing problems.

Breakwaters, Jetties and Groins

Breakwaters, jetties and groins are structures used to stabilize beaches and other shorelines subject to longshore drift currents. Such structures are rarely successful for long periods of time unless they are part of a comprehensive plan that considers shore processes affecting large stretches of shoreline. Isolated stabilization attempts generally cause more problems than they solve, and for this reason, plans for all such structures must be reviewed and approved by the Florida Bureau of Beaches and Shores.

Recommendations:

1. Any plans for breakwaters, jetties and groins should be analyzed to insure that erosion or undesirable shoaling is not induced in adjacent areas.
2. Any plans for beach stabilization projects should be submitted for review by the Florida Bureau of Beaches and Shores at the earliest possible time.

Dredging, Filling and Artificial Waterways

Until recently, development in many coastal areas of Florida has been synonymous with dredging and filling. Thousands of acres of low-lying or submerged lands have been made usable by this technique, and in some areas, this may be the only practical means of making the land suitable for development. But detrimental effects of such development may in many cases outweigh the benefits.

Most residential developments created by dredging and filling utilize artificial waterways, not primarily for waterfront access as is often assumed, but as a source of fill material to raise the adjacent land to minimum usable elevations. This has, in numerous cases, resulted in labyrinthine dead-end canal systems that become liabilities to maintenance of water quality. In addition to this problem land so created generally has a significant hurricane flood hazard, causes pollution problems if septic tanks are used, and results in loss of ecological values of the area. Artificial waterways also create potential salt-water intrusion problems.

Dredging in shallow water areas can always be anticipated to have some adverse environmental impact, at least temporarily. There are cases where such effects are a necessary trade-off for legitimate public interest projects, but there are techniques that can be employed to minimize these adverse effects and thus maximize public benefits.

Recommendations:

1. Dredging and/or filling of submerged lands should be kept to a minimum.
2. Residential developments that are feasible only through creation of land by dredging and filling of submerged areas should be strongly discouraged by local governments.
3. Proposed upland waterway systems should be carefully considered by local regulatory bodies before submission for state review to determine the long-term effect the entire upland development will have on water quality.
4. Any state-approved excavations in submerged areas to obtain fill should be held to a minimum, i.e. raise only the house pads, streets and driveways to the required elevation.
5. Residential development should not be permitted directly on any artificial waterway.
6. Buffer zones of natural vegetation should be established between development and any waterways.
7. Artificial waterways should be designed to ensure adequate flushing. Dead-end waterways should be avoided.
8. Waterway connections to open water should be located in areas where impact on the littoral zone will be minimized.
9. Approved upland waterway construction should be done in the dry, if possible, so that shaping and stabilization of the banks can be completed before the "plug" is removed for connection to open waters.
10. Artificial waterways should generally not be excavated to depths greater than six feet, mean low water, to allow establishment of vegetation on the canal bottoms.
11. The sides of artificial waterways should be gently sloping rather than vertical to facilitate biological as well as physical stabilization of the canal shoreline.
12. The berm of artificial waterways should be raised so that there is a gradual slope away from the canal edge. This will help prevent introduction of contaminants into adjacent water bodies.
13. Because present state policy specifies that the process of dredging upland canals does not thereby establish justification for the later issuance of a permit to connect them to public waters, all necessary permits for construction should be obtained *before* any residential lots are sold in areas requiring dredge and fill.
14. Dredging and filling for public shoreline projects should be planned for only if the activity is water dependent and there are no feasible alternatives.
15. Dredging for navigational access should be well planned to prevent unnecessary channels. In areas having shallow water shorelines, peripheral canals on the upland, leading to a central navigational channel, should be considered rather than separate access channels for each waterfront landowner. Also, central marina facilities should be used if possible rather than providing individual facilities.
16. All dredging spoil material should be placed on suitable upland rather than in water areas. There usually is a fee charged for any such material removed from state-owned submerged areas and placed on privately-owned upland.
17. All dredging in submerged areas should be done with hydraulic suction dredges rather than draglines.
18. Turbidity control mechanisms such as diapers and weirs should be used to protect water quality in adjacent areas during construction.
19. Adequate diking should be constructed to contain fill material on upland areas and allow for settling of fine materials.
20. Runoff from dredging operations should utilize natural drainage patterns where possible.
21. All plans for dredging should be submitted for review by state regulatory agencies at the earliest possible time.

Docks and Piers

Docks and piers are probably the oldest method of gaining access to deep water. They are also probably the least objectionable from an ecological point of view. They do, however, sometimes pose navigational problems, restrict public use of the waters, and cause conflicts with area aesthetics and adjacent land uses.

Recommendations:

1. Docks and piers should not hinder navigation or public use of the waters.
2. Docks and piers should be constructed and maintained in a manner that does not degrade area aesthetics or conflict with adjacent shoreline uses.
3. Docks and piers should be constructed in a manner that does not restrict water flow.
4. Docks and piers, in addition to local approval, require permits from the Trustees of the Internal Improvement Trust Fund and the U.S. Army Corps of Engineers. All approvals should be obtained before any dock or pier construction is undertaken.

5. Maintenance of docks and piers is the responsibility of the owner. Local governments should enact and enforce ordinances which prevent such structures from becoming public nuisances. Such ordinances should provide for removal of neglected structures at the owner's expense.

Removal of Natural Vegetation

Natural vegetation serves several important functions in coastal areas. Among these are provision of habitat for various important animal and bird species; air purification; noise reduction; retardation of runoff and retention of soil moisture; prevention of shoreline erosion; buffering of storm surges; prevention of wind erosion; utilization of excess nutrients; and filtration of sediments and pollutants which may endanger water quality in adjacent areas. Thus, it is apparent that "worthless" vegetation that poses a hinderance to development may actually be serving a more important function in preserving environmental quality.

The importance of preventing unnecessary ground clearing cannot be overstressed, particularly in shoreline areas and on slopes. Retention of as much natural vegetation as possible will aid considerably in protecting water quality, marine productivity, and living conditions in the coastal zone.

Recommendations:

1. Development should preserve as permanent open space buffer zones of natural vegetation on slopes and along the shoreline.
2. In areas where temporary removal of vegetation is necessary during construction, replanting should be carried out as soon as feasible.
3. Landscaping around developments should utilize, where possible, native species that are adapted to soil, water, and temperature conditions of the area. This allows ground cover without introduction of fertilizers, pesticides and other potentially harmful materials that are often necessary for survival of non-indigenous plants. Many times native plants can be salvaged before development occurs and later used for landscaping.

Development in Wetland Areas

The values associated with Florida's wetlands have only recently been recognized by the public. But there is now little disagreement among agencies involved in resource-use management that these areas are one of our most valuable resources. There is also little disagreement among these agencies as to wetlands' sensitivity to alteration, particularly by drainage. Activities that have little effect in other locations have a wide range of effects in wetlands areas. For this reason, wetlands development should not be anticipated.

Recommendations:

1. Wetlands should be avoided by all development if possible.
2. Any development that does occur in wetlands areas should take special care to avoid unnecessary ecological or hydrological damage to the area.

Residential Development

Residential development has probably had more impact on Florida's landscape than has any other single type of development. The prospect of continued rapid population increase, primarily from in-migration, suggests that this situation will continue into the future. This presents problems to both state and local governments in that residential development is not always a benefit, even in a strictly economic sense.

With new residents come demands for services such as schools, police and fire protection, water supplies, sewage treatment, electricity, road maintenance, etc. New residents arrive expecting to have these services already available, but in rapidly-growing areas this is seldom the case. The result is often deficit spending to provide the services, rapidly-increasing taxes, and/or an absence of adequate facilities and services. This can create a situation where effective planning is stymied, resulting in unnecessary destruction of natural resources, hodge-podge development, and general degradation of living conditions in the area.

The answer to this problem is not a halt to all future residential development, but rather to allow only development that is well planned and in accordance with local government's ability to provide and maintain necessary services.

This demands that residential development be allowed only in those areas where physical conditions will not present future maintenance problems from flooding, inadequate septic tank functioning, shoreline erosion, etc. It also demands that timing of development be in phase with expansion of sewer and water facilities, building of new roads and schools, increased police and fire protection, recreational facilities, etc. The common practice of allowing "leap frog" subdivision development will thus have to be changed to one of permitting only orderly, timed development in areas where services can be provided. Unless this is done, the long-term consequences are clear: urban blight, slums, higher taxes, inadequate services, and environmental degradation.

Recommendations:

1. Effective subdivision regulations should be enacted and enforced by local government. State assistance is available for drafting such regulations.
2. Residential subdivisions should not be permitted in areas where local government will inherit unnecessary maintenance problems from the developer.
3. The costs for roads, sidewalks, water and sewer lines, and storm sewers within residential subdivisions should be borne by the developer, with project acceptance by local government only if rigid construction standards are met.

4. Local governments should develop long-range plans for guiding residential subdivision development into areas suitable for development.
5. Subdivision regulations should be performance-oriented rather than means-oriented if possible to allow flexibility in the techniques used to achieve desired goals of local government.
6. Residential subdivisions should be planned in accordance with natural characteristics of the land rather than simply laying out a grid pattern that ignores slope, elevation, drainage patterns, natural vegetation, and accessibility.
7. Maximum retention of green areas and open space should be encouraged, with density and setbacks being controlled by utilization of the "planned unit development" concept where possible.
8. Runoff from streets and yards should be carefully controlled to prevent flooding in adjacent areas or pollution of water bodies. Catchment basins should be constructed at storm sewer outfalls to prevent silt and other pollutants from entering water areas.

Septic Tanks

Proliferation of septic tanks is one of the most serious problems associated with development in many areas. Inadequate controls on this aspect of development has, in numerous cases, resulted in septic tanks being used where soils are not suitable or at densities far too great for proper functioning. This poses a threat to water quality, public health, and marine resources. The present means of controlling septic tank use is through local building codes subject to state rules. In many areas public apathy has been so great that no building codes exist. In other areas they are not enforced adequately. In still other areas, development is occurring so rapidly that local officials cannot review the applications fast enough to keep up. This situation can only be remedied through long-range planning at the local level, carried out in conjunction with rigidly enforced building codes.

Recommendations:

1. Septic tanks should not be allowed in residential subdivisions built on soils having either low permeability, high water table or high organic matter content.
2. Septic tank drainfields should be located at distances far enough away from water bodies to preclude seepage from the drainfields from entering the water body. In no case should this be less than fifty feet from the high water line of the water body.
3. Septic tank use should be planned for only in rural areas. For urban subdivisions and high density use areas, septic tanks should not be considered as a permanent answer to sewage disposal, regardless of soil conditions.
4. The use of septic tanks should be *only* in conformance with rules adopted by the Florida Department of Pollution Control (Ch. 17-13, F.A.C.).

Solid Waste Disposal - Sanitary Landfill Sites

Solid waste problems in Florida and especially in the coastal zone are becoming increasingly complex. Each person in Florida now generates about five pounds of solid waste per day. By 1990, it is anticipated that the per capita generation of solid waste should reach up to 12 pounds a day, more than double the present amount. If present trends continue, by the year 2000 generation of solid waste in Florida's coastal zone will exceed 75,000 tons per day or over 27 million tons per year. This would cover a road 25-feet wide from Tallahassee to Miami to a height of 50 feet!

The problems associated with disposal of such massive quantities of material are compounded by concentration in a relatively small portion of the state's land area and the increasing scarcity of suitable disposal sites. If we are to prevent water pollution, habitat destruction, health problems, loss of aesthetics, depressed real estate values and unnecessary public expense brought about by improper solid waste management, it is mandatory that every level of government become engaged in developing long-range solid waste management programs.

Recommendations:

1. Every municipality and county government should conduct a coordinated solid waste management program.
2. All open dumps should be closed, converted to sanitary landfill operations or employ other approved methods of disposal.
3. Selection and operation of sanitary landfills should be in accordance with a long-term plan developed by competent authorities.
4. Solid waste management programs should be carried out on a regional basis where possible.
5. Appropriate agencies of local government should utilize the available talents and assistance offered by the Solid Waste Planning Section of the Florida Department of Pollution Control.
6. Proposed developments in the coastal zone should be analyzed carefully by local governments to determine their impact on existing solid waste management programs.

Forest Management Practices

Florida's coastal zone contains substantial areas that are committed to production of timber products. This activity constitutes an important segment of the economy in some

locales and is vital to proper functioning of our entire society. But timber production is an extensive land use, with very low profits per unit of production and long time periods required for realization of profits. For this reason, some timber management operations have employed utilization of faster-growing species of trees with more trees per acre. Experience has shown, however, that extremely high density plantings are not generally as efficient as lower density plantings. Also, because of certain harvesting advantages, the practice of clear-cutting and replanting of solid stands of single-species trees has become widespread, and ecological and aesthetic values have, in some cases, been threatened.

Florida's recently-enacted "Greenbelt Law" relieves some of the pressure for realizing maximum possible profits from forest lands and makes practices such as selective cutting and multiple use more attractive to timber interests. There are certain other techniques that can be employed to lessen the harmful effects of timber production and harvesting, and these should be used as much as possible.

Recommendations:

1. Timber Cutting

A. Selective, seed tree, or shelterwood harvesting should be employed to favor natural regeneration for all areas unless timber stand conditions require clearcutting and artificial regeneration. All clearcutting should be done in such a manner as to create irregular-shaped areas, preferably following natural vegetation, topographic boundaries or natural stand boundaries to create edge effect.

B. Clearcutting of areas bordering publicly maintained roads should be restricted to a distance of one-fourth mile or greater away from the road and designed to fit the environment.

C. When two or more clearcut areas are planned for the same or adjacent compartments, they should be separated by timber stands of at least half the acreage site or greater, and at least ten years old. When two or more clearcut areas are planned for the same or adjacent compartments, they should be separated by similar timber stands of equal or greater size.

D. Harvesting of hardwood stands should be restricted to selective cutting, with cutting designed to favor development of valuable wildlife tree species where possible. Do not convert good hardwood stands to pine.

E. Key wildlife areas in all timber types should be preserved. These would include hammocks, rookeries or other nesting areas, live oak clumps, and scrub areas. Every effort should be made to enhance natural vegetative areas that are important as food producers or furnish special habitat requirements.

F. There should generally be no timber cutting for a minimum of fifty yards along each side of a major or navigable stream, with selective cutting only for the next fifty yards.

G. There should generally be no timber cutting for a minimum of 15 yards along minor, intermittent or non-navigable streams, with selective cutting only for the next 25 yards.

H. In areas where conditions warrant harvesting of trees adjacent to navigable streams, care should be taken to prevent blockage of the stream to boat traffic. Any trees so felled should be removed before logging operations are completed.

2. Tree Planting

A. Plantings should be spaced 8' x 12' (454 trees per acre) or greater for slash, loblolly or sand pine, and 6' x 12' (605 trees per acre) or greater for longleaf pine. All planting areas should be site prepared.

B. In all pine plantings the plantation size should not exceed 75% of the total stand acres. The remaining 25% should, if possible, be set aside for wildlife purposes including key areas, food plots, natural areas and strips around pond margins and between stands. In all pine plantings the plantation size should not exceed 60 acres.

C. An uncleared natural fringe of one or two-chain width should be left around all cypress ponds. Mature timber can be harvested from this fringe.

D. A cleared one to two-chain strip should be left between planted and natural areas, or between two planted areas.

E. Tree planting along main roads should be separated by a minimum distance of five chains and should have a minimum age variation of five years.

3. Timber Stand Improvement

A. There should be no large continuous areas of TSI work. Small pockets not exceeding one-half acre of good reproduction in need of selective release should be encouraged.

B. There should be no TSI work in areas considered key wildlife lands, except to enhance wildlife.

4. Controlled Burning

A. Plans should be made to control burn suitable areas every two to four years. Any controlled burning should be done in compliance with pollution control regulations.

B. Selective summer burning is permissible, providing benefits are greater than losses. Special consideration should be given to wildlife and aesthetic values.

5. Other

A. Specialized forest management should be employed as necessary to protect or increase rare, endangered or otherwise unique species of vertebrates, invertebrates or plants. A minimum of ten undisturbed acres should be left around colonies of the red cockaded woodpecker, with a minimum of five acres around individual nest trees. Additional consideration should be given to areas containing active nests of Bald Eagles and Ospreys.

B. Where possible, timberlands should be open to the public for hunting, fishing, camping, and other compatible outdoor sports.

Agricultural Practices

In general, agriculture occupies only a small portion of Florida's coastal zone, with citrus groves, vegetable crops, ornamental flowers, and ranching accounting for most of this activity. However, there are vast areas adjacent to the coastal zone that are committed to agriculture, with citrus production and ranching being the most important from a coastal zone management point of view. A primary state concern with these important activities relates to their potential for damaging coastal zone resources. It is mandatory that all economic activities, including agriculture, consider prevention of pollution a part of their operating expenses.

Citrus and Truck Farms

Florida has long been recognized as the citrus capital of the nation and a winter vegetable center. The state produces at least 85% of the grapefruit, 70% of the oranges, and virtually all of the tangerines grown in the United States. The production of vegetables, though not as impressive as citrus, is a very significant part of U.S. production.

Ironically, one of the primary problems facing the citrus industry is the ability to produce too well, thus creating a marketing problem. In addition to this, foreign competition, rising taxes, rising production costs, and urban growth pressures are factors working against continued expansion of citrus production in the coastal zone. Unfortunately, expansion that does take place is generally into areas that are of marginal value for this activity and have the potential for causing widespread damage to coastal resources.

Thousands of acres of Florida's wetlands have been converted to citrus and truck farming use in recent years, and many long-term problems are becoming apparent. For instance, fertilizers and pesticides have entered coastal waters, contributing to eutrophication, reduction of bird populations, and reduction in fish populations in some areas. Other areas have been subject to salt-water contamination of water supplies, brought about by over-withdrawals of ground water for irrigation. In still other areas loss of muck soils is becoming a very difficult problem. It is apparent that prevention of such effects must be a significant concern in future citrus and vegetable production.

Recommendations:

1. Further expansion of ctirus groves and vegetable farms into wetlands areas should be stringently discouraged.
2. Aerial application of pesticides should not be done adjacent to wetlands or water bodies.
3. Citrus groves in close proximity to water bodies should utilize fertilizers in pelletized, rather than powder form to help prevent their introduction to water areas.
4. In order to prevent depletion and degradation of coastal ground water supplies, citrus groves should not be expanded into areas where irrigation from ground water sources is necessary.
5. Runoff from citrus groves and vegetable fields should be minimized and contained.
6. Use of long-lasting pesticides on citrus groves and vegetable fields should be discouraged.

Ranching and Dairying

Ranching and dairying activities in or adjacent to Florida's coastal zone have increased dramatically in the last decade and can be expected to increase further in the future. The potential for increased ranching activities is especially good and this activity can be expected to make large expansion into areas that are not suitable for cropland or building purposes.

The most significant problem to be dealt with in ranching and dairying, from the standpoint of coastal zone management, is control of pollution caused by runoff from pastures and feed lots. The pollution potential from cattle is roughly 19 times that to be expected from humans. This is primarily in the form of excessive nutrients and bacteria, which can cause closing of shellfish and swimming areas many miles away.

Ranching and dairying can make substantial use of many areas classified as "Conservation" in the *Coastal Zone Management Atlas,* provided that the pollution potential is recognized and appropriate protective measures are taken.

Recommendations:

1. Pastures should not be planted immediately adjacent to streams, canals, lakes, and other water bodies. A buffer zone of natural vegetation should be left in such areas.
2. Provisions should be made to contain runoff from feed lots, holding pens or other high concentration areas. Treatment facilities for use of runoff waters as fertilizer for pastures should be considered and utilized if possible.
3. Ranching or dairying activities should not be located in areas that could threaten the quality of Class I or Class II waters.

Amenities, Aesthetics and Design

Amenities and aesthetics include almost all characteristics of natural and man-made components of the landscape. (In the coastal zone "landscape" encompasses land, streams, estuaries and bays, offshore waters of the Gulf or Atlantic, and air and sky quality.) While aesthetics refers primarily to scenic or perceived qualities and amenities involve the use of components of the landscape for recreation, recreational access,

property enhancement, and other environmental benefits, the two terms are closely allied and should be considered integral for purposes of coastal zone management. From the point of view of environmental quality, amenities and aesthetics can be interpreted to mean qualities that enhance man's esteem of an area.

With growing public concern for environmental quality, it can be safely stated that public esteem of the amenities and aesthetics of any particular area of the coastal zone may potentially enhance or downgrade social and economic well-being within the area.

A comprehensive assessment of the coastal landscape, its biotic and non-biotic resources, and the activities which man may arrange among them is a necessary step toward long-term resource management and securing maximum public benefits, many of which are very difficult to quantify in absolute terms.

Techniques are now available for making systematic assessment of relative aesthetic values of various components of a given area's landscape. Also available are techniques for maximizing aesthetic values in the development of an area. Research into this topic indicates that many landscape components of high aesthetic value also have very high ecological value and very low development suitability. Many other aesthetically valuable areas are also well suited to development if proper design techniques are utilized. The often complementary nature of aesthetics and ecological values gives additional support to the concept of trying to maximize the public benefits of development through careful analysis of, and design in accordance with, physical characteristics of the landscape.

Recommendations:

1. The identification and assessment of aesthetic and amenity values and the formulation of plans for maximizing these values should be a viable part of local planning programs.
2. Maximum efforts should be made to provide, enhance, and preserve scenic views of the water. Vista points should be included in local plans.
3. Proposed shoreland development should be restricted from blocking scenic views unless there is an over-riding public interest.
4. To maximize the attractiveness of shoreland setting for dwellings, development should display principles of good design. Subdivision layouts should be developed in proper relation to existing and other proposed developments, the topography, surface water, vegetative cover, and other natural features. Compatibility of appearance as well as compatibility of use is desirable; this means harmony, not necessarily uniformity.
5. To conserve natural landscape, the cluster development or planned unit development is advantageous. Such development should be used to preserve certain open space, especially along the shoreline, by legal means that will guarantee its remaining open space in perpetuity.
6. All but the smallest waterfront subdivision should be required by local authorities to provide pedestrian access to the water. Such access should be wide enough to permit hedges or other landscaping on both sides, for both privacy and aesthetic appeal.
7. The placing of utilities underground has definite aesthetic benefits and should be encouraged.
8. Secondary or collector road construction through forested areas should preserve as many trees along the right-of-way as possible.
9. Building heights along the waterfront should be restricted to prevent development from creating "concrete barriers" to the waterfront. Construction of condominiums and other high-rise structures should be restricted to areas away from the shoreline.
10. The indiscriminate use of off-premise commercial advertising signs and billboards which create a negative aesthetic effect should be prevented.

(Recommendations Subject to Change)

SELECTED BIBLIOGRAPHY

Barada, William, 1972. *Report of investigation of the environmental effects of private waterfront canals: a report to the Board of Trustees of the Internal Improvement Trust Fund.* Winter Park, Fla., Environmental Information Center.

Battelle Memorial Institute. Pacific Northwest Laboratories. 1971. *Shoreland management guidelines to Grays Harbor Regional Planning Commission.* Richland, Wash.

Bue, Conrad D. 1967. *Flood information for flood-plain planning.* Washington, D. C., U.S. Department of the Interior, Geological Survey.

Carlozzi, Carl A. 1971. *Enhancement of ecological and aesthetic values of water associated with interstate highways.* Amherst, Mass., University of Massachusetts, Water Resources Research Center.

Coastal Zone Resources Corporation. 1971. *A plan and program for amenities and aesthetics in the Escarosa pilot area: a working paper report to the Coastal Coordinating Council, Florida Department of Natural Resources.* Wilmington, N.C.

Environmental Protection Agency, Office of Water Programs. Sept. 1971. *Control of erosion and sediment deposition from construction of highways and land development.* Washington, D. C., Superintendent of Documents, U.S. Government Printing Office.

Florida Agriculture & Consumer Services Department. Division of Forestry. 1973. *Withlacoochee State Forest specialized management practices for wildlife and aesthetic development,* Jan. 15, 1973. Tallahassee, Fla.

_____. _____. *Blackwater River State Forest specialized management practices for wildlife and aesthetic development.* Jan 15, 1973. Tallahassee, Fla.

Florida. *Beach and shore preservation act.* Statutes (Chapter 161). Tallahassee, Fla.

Florida. Board of Trustees of the Internal Improvement Trust Fund. 1969. *Aquaculture lease guidelines,* August 26, 1969. Tallahassee, Fla.

_____. _____. 1972. *Resolution establishing Trustees' policy regarding construction of upland canal systems prior to requesting permits for their connection to navigable waters, October 4, 1972.* Tallahassee, Fla.

Florida. Cabinet. 1969. *Aquatic preserves resolution, Nov. 24, 1969.* Tallahassee, Fla.

Florida. Coastal Coordinating Council. 1971. *Coastal zone management in Florida—1971.* Tallahassee, Fla.

_____. _____. 1972. *Florida coastal zone management atlas: a preliminary survey and analysis.* Tallahassee, Fla.

Florida. *Coastal Coordinating Council organization act.* Statues (Chapter 370.0211). Tallahassee, Fla.

Florida. Department of Health & Rehabilitative Services. Division of Health. 1971. *State of Florida solid waste management plan.* Jacksonville, Fla.

_____. _____. Undated. *A handbook for sanitary landfills in Florida.* Jacksonville, Fla.

Florida. Department of Pollution Control. 1972. *Classification of waters within the State of Florida.* Tallahassee, Fla.

_____. _____. 1971. *Proposed recommendations for dredge and fill permitting.* Tallahassee, Fla.

Florida. Inter-Agency Advisory Committee on Submerged Land Management. 1968. *A proposed system of aquatic preserves.* Tallahassee, Fla.

Florida. Secretary of State. 1972. *Florida administrative code: chapter 17-13—Standards for individual sewage disposal facilities.* Tallahassee, Fla.

_____. _____. *Florida administrative code, chapter 17: rules of the Department of Pollution Control.* Tallahassee, Fla.

_____. _____. *Florida administrative code, chapter 18: rules of the State of Florida Board of Trustees of the Internal Improvement Trust Fund.* Tallahassee, Fla.

Florida. Statutes. *1972 amendments to section 193.461 and section 193.501* (HB 3772). Tallahassee, Fla.

Florida. University. Gainesville, 1972. *Identification and evaluation of coastal resource patterns in Florida.* Gainesville, Fla., University of Florida, Department of Architecture.

Heald, Eric J. 1971. *The production of organic detritus in a south Florida estuary.* Coral Gables, Fla., University of Miami, Sea Grant Program.

McHarg, Ian L. 1971. *Design with nature.* Garden City, N.Y., Doubleday/Natural History Press.

Michigan. Department of Natural Resources and Water Resources Commission. Oct. 1972. *A plan for Michigan's shorelands* (Draft copy).

O'Connor, Dennis M., and McNichols, Walter J. 1972 *Legal aspects of the coastal zone.* Miami, Fla., University of Miami, Law School.

Odum, William E. 1971. *Pathways of energy flow in a south Florida estuary.* Miami, Fla., University of Miami, Sea Grant Program.

Refuse Act of 1899 (Rivers and Harbors Act of 1899). *U.S. Code,* Vol. 33,401-413; Section 407.

Runkle, Herbert M., and Perkins, Thomas H. 1971. "Project 2000: a planning imperative." *Water Resources Bulletin,* 7:2 (April 1971), pp. 348-354.

Sharpe, M. Hervey (ed.). 1965 *The DARE Report.* Gainesville, Fla., University of Florida, Institute of Food and Agricultural Sciences.

Shaw, Samuel P. 1956. *Wetlands of the United States: their extent and value to waterfowl and other wildlife.* Washington, D.C., Department of the Interior, Fish and Wildlife Service.

Sheaffer, John R. 1967 *Introduction to flood proofing.* Chicago, Ill., University of Chicago, Center for Urban Studies.

Skinner, John E. 1971. "Eco-engineering: the challenge of resource development." *Water Resources Bulletin,* 7:2, pp. 355-367.

U.S. Army Corps of Engineers. 1970. *Environmental guidelines for the civil works program of the Corps of Engineers.* Washington, D. C., Institute for Water Resources.

_____. May 1967. *Guidelines for reducing flood damages.* Vicksburg, Miss. Army–MRC.

_____. 1971. *National shoreline study: shore management guidelines.* Washington, D. C.

_____. 1971. *National shoreline study: shore protection guidelines.* Washington, D. C.

_____. 1961. *Survey report: analysis of hurricane problems in coastal areas of Florida.* Jacksonville, Fla., Jacksonville District.

_____. 1970. Corps offers guidelines for construction in navigable waters (News release). Seattle, Wash., Public Affairs Office.

U.S. Department of Agriculture. Feb. 4, 1971. Soil Conservation Service Watersheds Memorandum–108. *Guidelines for planning and review of channel improvement.* Washington, D. C.

U.S. Department of Health, Education and Welfare. Bureau of Solid Waste Management. 1970. *Policies for solid waste management.* U.S. Government Printing Office, Washington, D. C.

U.S. Department of Housing and Urban Development. 971. "National flood insurance program." *Federal Register,* XXXVI, Sept. 10, 1971, pp. 18175-86.

_____. 1972, "National flood insurance program." *Federal Register,* XXXVII, January 22, 1972, pp. 1036-37.

U.S. Department of Transportation. Federal Highway Administration. 1972. *Proposed general guidelines for consideration of economic, social, and environmental effects of highway projects.* Washington, D. C.

U.S. Federal Water Quality Administration. 1970. *Design, operation and maintenance of waste water treatment facilities: federal guidelines.* Washington, D. C.

_____. *Planning guidelines: handbook* (Review draft). Washington, D. C.

U.S. Fish and Wildlife Service. Southeastern Region. 1971. *Guidelines for federal permit applications in navigable water.* Atlanta, Ga.

U.S. Water Resources Council. 1970. *Regulation of flood hazard areas to reduce flood losses.* Washington, D. C.

Washington. Department of Ecology. 1972. *Final proposed guidelines: Shoreline Management Act of 1971.* Olympia, Wash.

White, G. G. 1961. *Papers on flood problems.* (Research paper no. 70). Chicago, Ill., University of Chicago, Department of Geography.